REMARKS

Status of the Claims

In the present application, Claims 1-45 are currently pending, with Claims 23-31, 42, and 43 withdrawn from consideration as being drawn to a non-elected invention. Accordingly, Claims 1-22, 32-41, 44, and 45 are currently pending and under examination, all of which were rejected by the Patent and Trademark Office ("PTO").

Rejection under 35 U.S.C. § 103(a)

Claims 1-22, 32-41, 44, and 45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of U.S. Patent No. 6,478,903 to *John, Jr. et al.* (*"John"*) in view of U.S. Patent No. 2,111,203 to *Brün*. According to the PTO, *John* discloses a primer composition including an oxidizer (*e.g.,* potassium nitrate), a secondary explosive (*e.g.,* PETN), a sensitizer (*e.g.,* tetrazene), a metallic fuel (*e.g.,* aluminum), and **bismuth sulfide** as the fuel or flammable material. The PTO also states that *Brün* discloses **bismuth trioxide** as a catalyst in a primer mix. According to the PTO, it would have been obvious to use *Brün's* bismuth trioxide with *John's* primer composition, because "Brun suggests that the bismuth trioxide catalyst has been found to be applicable to priming mixtures generally and since John, Jr. et al suggests the use of a bismuth salt for use in priming compositions." (Office Action page 3, 3rd paragraph.) Respectfully, Applicants traverse this rejection for at least the following reasons.

1. There is no suggestion or motivation to combine *John* and *Brün.*

According to *John*, "[b]ismuth sulfide and zinc sulfide act as **fuels** for potassium nitrate and aluminum nitrate, which act as **oxidizers**, to provide an ignition flame." (Emphasis added, col. 2, ll. 48-50.) Thus, bismuth sulfide is a **fuel to be oxidized** upon its reaction with an oxidizer, consistent with the description of bismuth sulfide as an "inflammable material." (col. 2, ll. 57-58). According to the treatise, *Explosives* (5th Ed.; R. Meyer, J. Köhler, and A. Homburg; Wiley-VCH Verlag GmbH; Weinheim (2002)), a "fuel" can be defined as a "substance capable

of reacting with oxygen and oxygen carriers (oxidizers) with the evolution of heat." A copy of the relevant pages are attached hereto.

According to *Brün*, bismuth trioxide is a **catalyst** for the combustion of a priming mixture, regarding which *Brün* discloses the following:

> "They [catalysts] are used in amounts of such small proportion that they **cannot be considered themselves to enter into the reaction, either as oxidizers or as fuels**; instead, they act as true catalysts, merely facilitating the reactions among other ingredients and probably themselves remaining substantially unchanged." (Emphasis added; col. 1, ll. 31-38.)

Thus, *Brün's* bismuth trioxide is **neither an *oxidizer* to be reduced, nor a *fuel* to be oxidized**, and therefore, according to *Brün*, bismuth trioxide cannot be a substitute for either oxidizer or fuel. Consistent with this feature is *Brün's* disclosure that "[t]he presence of even minute quantities of such catalysts has been found to be very beneficial" (col. 2, ll. 23-25).

The Federal Circuit has made clear that, "[i]n holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce the claimed invention." *Karsten Mfg. Corp. v. Cleveland Gulf Co.*, 242 F.3d 1376, 1385, 58 U.S.P.Q.2d 1286, 1293 (Fed. Cir. 2001). Respectfully, Applicants maintain that *John* discloses the use of a bismuth compound, specifically bismuth sulfide, *only* **as a fuel to be oxidized**, that is, a substance that acts as a **reducing agent** which is used in combination with an oxidizing agent such as potassium nitrate. *John* offers no suggestion of any other utility of bismuth sulfide. Further, *Brün* discloses the use of a bismuth compound, specifically bismuth trioxide, *only* as a **catalyst** that is **neither an oxidizer nor a fuel**, and which is used *only* in catalytic amounts. *Brün* offers no suggestion that bismuth trioxide can, in any way, enter into the reaction as an oxidizer or as a fuel. Therefore, Applicants respectfully assert that there is **no** suggestion or motivation that would lead one of ordinary skill to select the *John* and *Brün* references and combine them as the PTO has done.

2. The combination of *John* and *Brün* changes the principle of operation *and* destroys the intended function of each reference, thereby "teaching away" from the claimed invention.

Respectfully, Applicants maintain that if *John* and *Brün* are combined in the way the PTO proposes, such a proposed combination would change the principle of operation of each reference. According the MPEP 2143.01(VI), "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)."

John discloses the use of bismuth sulfide *only* as a **fuel** to be oxidized that is used in combination with an oxidizing agent such as potassium nitrate. *Brün* discloses the use of bismuth trioxide *only* as a **catalyst** that is neither an oxidizing agent nor a fuel, and which is used *only* in catalytic amounts. If one were to use *Brün's* bismuth trioxide with *John's* primer composition as the PTO suggests (Office Action page 3, 3rd paragraph), such a proposed combination would require changing the principle of operation of *John's* bismuth compounds which act as **fuels**, because *Brün* teaches that bismuth trioxide **cannot** "enter into the reaction, **either as oxidizers or as fuels**" (emphasis added; col. 1, ll. 33-35). Moreover, such a proposed combination would likewise require changing the principle of operation of *Brün's* bismuth compounds which act as *catalysts* that merely facilitate the reaction and remain substantially unchanged, because *John* teaches that "[b]ismuth sulfide and zinc sulfide act as **fuels** for potassium nitrate and aluminum nitrate, which act as oxidizers, to provide an ignition flame" (emphasis added, col. 2, ll. 48-50).

For these same reasons, if one were to use *Brün's* bismuth trioxide with *John's* primer composition as proposed by the PTO, such a combination would destroy the intended function of *John's* bismuth compound which acts as a fuel/reducing agent, because *Brün* discloses that bismuth trioxide cannot enter into the reaction as a fuels (col. 1, ll. 33-35). The PTO's proposed combination would also destroy the intended function of *Brün's* bismuth compound which acts

as a *catalyst* that merely facilitates the reaction and remains substantially unchanged, because *John* discloses that bismuth sulfide is a fuel (col. 2, ll. 48-50).

The Federal Circuit had made it very clear that one must look to see if "the prior art would have suggested to one of ordinary skill in the art that this process should be carried out and would have had a **reasonable likelihood of success** viewed in light of the prior art." Emphasis added; *In re Dow Chemical Co. v. American Cyanamid Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988). Respectfully, Applicants maintain that the PTO's proposed combination of *John* and *Brün* to use *Brün's* bismuth trioxide in place of *John's* bismuth sulfide **destroys** the function of the bismuth-containing compounds of both references, and therefore constitutes an improper rejection. *See: In re Fritch*, 972 F.2d 1260, 1265 n.12, 23 U.S.P.Q. 2d 1780, 1783 n. 12 (Fed. Cir. 1992); *In re Peterson*, 315 F.3d 1325, 1331, 65 U.S.P.Q.2d 1379, 1384 (Fed. Cir. 2003).

Because the PTO's proposed combination of *John* and *Brün* **destroys the function** of the bismuth-containing compounds of both references, and because the proposed combination would also **change the principle of operation** of the references being combined, *John* and *Brün*, either alone or in combination, are not sufficient to render the claimed invention *prima facie* obvious. MPEP 2143.01(VI). Respectfully, for at least these reasons, Applicants maintain that the PTO's proposed combination of *John* and *Brün* constitutes an unequivocal **teaching away** from Applicants' claimed invention, and therefore does not support a *prima facie* case of obviousness.

3. Even if *John* and *Brün* are combined as the PTO suggests, the combination neither teaches nor suggest the claimed invention.

The determination of obviousness under 35 U.S.C. § 103 is a legal conclusion based on factual evidence. *See*: *Burlington Indus., Inc. v. Quigg*, 822 F.2d 1581, 1584, 3 U.S.P.Q.2d 1436, 1439 (Fed. Cir. 1987). The prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated one of ordinary skill in the art to modify a reference or to combine references. *See*: *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Further, the prior art reference or combination of references must teach or suggest all the

limitations of the claims. *See: In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970). Respectfully, Applicants maintain that neither *John* nor *Brün*, either alone or in combination, render the claimed invention *prima facie* obvious, because these references do not teach or suggest all the limitations of the Applicants' claimed invention.

As discussed above, *John* discloses the use of bismuth sulfide *only* as a **fuel** to be oxidized that is used in combination with an oxidizing agent such as potassium nitrate. *Brün* discloses the use of bismuth trioxide *only* as a **catalyst** in which the bismuth trioxide is neither an oxidizing agent nor a reducing agent, and which is used *only* in catalytic amounts. Neither *John* nor *Brün*, either alone or in combination, teach or suggest a non-hygroscopic, non-corrosive **oxidizer system comprising bismuth oxide**.

For at least these reasons, Applicants respectfully assert that the PTO has not made a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Accordingly, Applicants request that the rejection of Claims 1-22, 32-41, 44, and 45 under 35 U.S.C. § 103(a), over *John* in view of *Brün* be withdrawn and these claims be allowed.

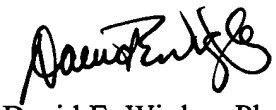
CONCLUSION

Respectfully, for at least the reasons provided, Applicants believe the claims are in condition for allowance and such action is respectfully requested.

No fees are believed due, however, the Commissioner is hereby authorized to charge any deficiencies which may be required, or credit any overpayment, to Deposit Account Number 09-0528.

Early and favorable consideration is respectfully solicited. If the Examiner believes any informalities remain in the application that can be resolved by telephone interview, a telephone call to the undersigned attorney is requested.

Respectfully submitted,



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Explosives

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[illegible] with a low content of nitroglycerine or nitroglycol powder form [illegible] slurries and permitted explosives [illegible] trate, dinitrobenzene; nitroglycol; nitroglycerine, nitrocellulose up to 13.4 % N, picric acid and TNT do not react up to a pistil load of 36 kp.)

between 0.01 and 1 kp in a small apparatus and between 0.5 and 36 kp in a large apparatus. The porcelain plate moves forwar and back under the porcelain peg; the stroke length is 10 mm in each direction. The two ends of the peg will serve for two trials and the two friction surfaces of the plate will serve for three trials each.

Friction sensitivity of explosive materials

(Sensitiveness to explosive materials)

The magnitude reported is the smallest load on the peg under which deflagration, crackling, or explosion has been observed at least once in six consecutive tests. The quantity of the test sample is 10 mm^3.

Fuel

Brennstoff; combustible

Most explosives and pyrotechnical compositions are prepared by a mixture of → *Oxidizers* and fuels. Fuel means any substance capable of reacting with oxygen and oxgen carriers (oxidizers) with the evolution of heat. Hence, the concept of fuel her has a wider significance than that of fuel in everyday language; thus, for instance, ammonium chloride in ion-exchanged → *Permitted Explosives* can act as a fuel.

Fumes

Schwaden; fumées de tir

The composition of the fumes produced by the detonation of an explosive can be found by calculation (→ *Thermodynamic Calculation of Decomposition Reactions*) or by detonating a cartridge of the explosive in question in a closed vessel (→ *Bichel Bomb*) followed by gas analysis of the fumes.

In the case of industrial explosives containing an excess of oxygen (→ *Oxygen Balance*), it is conventionally assumed for the calculated values that only CO_2, but no CO, and also that only H_2O, N_2 and excess O_2 are contained in the fumes. In reality the reaction is much more complex, and the product may in fact include CO, NO, NO_2, CH_4 and many other substances, if the explosive contained sulfur and/or chlorine compounds.